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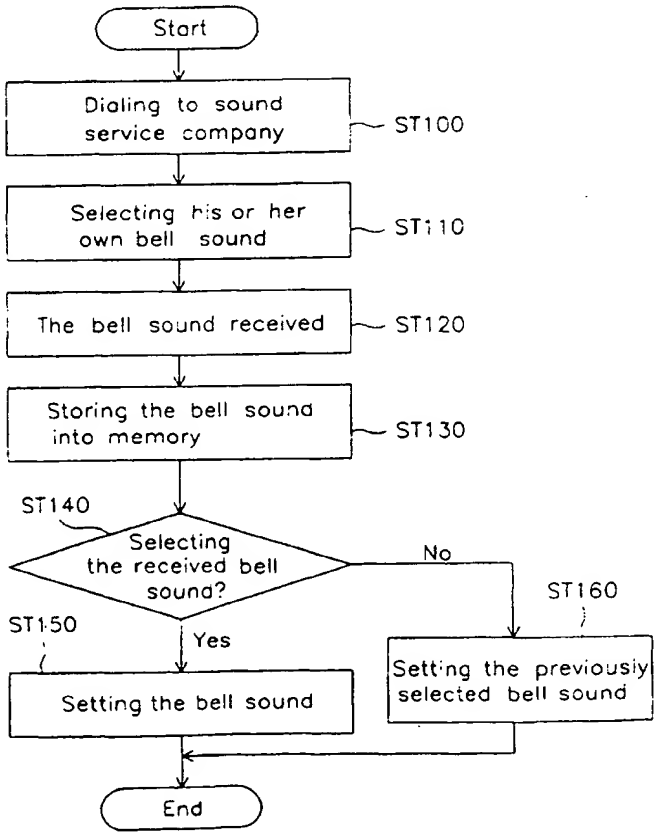
(57) Abstract

A bell sound selecting method for a cellular phone using an audio response system is disclosed. In this method, a user can easily recognize his or her own bell sound which is different from other's, by receiving his or her own distinctive bell sound from the audio response system and outputting the received bell sound when a call is received into the cellular phone. Therefore, the user of the cellular phone can correctly recognize his or her own bell sound even at a very crowded place.



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BELL SOUND SELECTING METHOD FOR A CELLULAR PHONE USING AN AUDIO RESPONSE SYSTEM

TECHNICAL FIELD

The present invention relates to a bell sound selecting method for a cellular phone using a response system, and in particular to a bell sound selecting method for a cellular phone which makes it possible to generate various bell sounds, so that an user can easily recognize his or her own bell sound.

BACKGROUND ART

Recently, the use of cellular phones has been rapidly increased, so that a communication between persons is easily implemented without any limit in place or time.

As one of the various functions of a cellular phone, there are many different kinds of bell sounds made for people to choose from so that they can easily recognize their own bell sound.

In a conventional bell sound recognizing method, a manufacturing company previously stores various bell sounds into a memory of a cellular phone when manufacturing the cellular phone. In this state, an user selects his or her own bell sound from the stored various bell sounds, so that the user can easily recognize his own bell sound when a call is received.

In this case, even when a certain bell sound is selected and then is outputted when a call is received, there is a limited number of different types of bell sounds. Therefore, one may use the same bell sound as others. In this case, when a call is received, and if a bell sound is generated at a crowded location, the user has to check whether the call is received into his cellular phone or not.

In addition, in order to make the bell sound different, when a new bell sound is inputted, an user must visit a bell sound providing company therefore causing much inconvenience for using a different bell sound of the cellular phone. In order to increase a number of different types of bell sounds,

the capacity of a memory of the cellular phone must also be increased.

DISCLOSURE OF THE INVENTION

Accordingly, it is an objective of the present invention to provide a bell sound selecting method for a cellular phone using an audio response system, which overcomes the problem of having a limited number of bell sounds in the conventional art, so it is capable of receiving a distinctive bell sound from a bell sound database and outputting the receiving bell sound when a call is received into a cellular phone, so that an user can easily recognize his or her own bell sound which is significantly different from others.

To achieve the above objectives, there is a bell sound selecting method provided for a cellular phone according to a first embodiment of the present invention which includes a first step for receiving an user's bell sound from a bell sound providing service company, thus storing the received bell sound into a memory and setting a certain mode based on an user's selection, a second step for searching a set state of a bell sound stored in the memory when a ring signal is received from a certain caller and judging whether a received bell sound is set, and a third step for reading a corresponding sound from the memory when the received bell sound is selected and outputted through a speaker, otherwise reading a previously selected bell sound from the memory and outputting the same.

Also, there is a bell sound selecting method provided for a cellular phone using an audio response system according to a second embodiment of the present invention which includes a first step for receiving an user's bell sound from an audio response system installed in a cellular phone service company, storing the received bell sound into a memory and changing a bell sound set state in accordance with a selection by the user, a second step for judging a set state of the bell sound when a call is received from a certain caller and judging whether the received bell sound

is set, and a third step for reading the bell sound from the memory when the received bell sound is selected, outputting the read bell sound through a speaker and otherwise reading the previously selected bell sound from the memory.

In addition, there is a bell sound selecting method provided for a cellular phone using an audio response system according to a third embodiment of the present invention which includes a first step for transmitting a frame to a cellular phone service company when an user's cellular phone is connected to an audio service system installed in a wired communication service company, a second step for changing a frame by the cellular phone service company which receives the frame, transmitting the changed frame to the cellular phone, receiving the changed frame from the cellular phone, storing into a memory and changing the bell sound set state in accordance with a selection of another user, a third step for judging a set state of the bell sound when a call is received from an opponent and judging whether the received bell sound is set or not, and a fourth step for reading a bell sound from the memory when the received bell sound is selected, outputting the read bell sound through a speaker, and otherwise reading the previously selected bell sound from the memory and outputting the sound.

Additional advantages, objectives and features of the invention will become more apparent in the description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow, and the accompanying drawings which are given by way of illustration only thus are not limitative of the present invention, and wherein:

Figure 1 is a block diagram illustrating a basic principle of the present invention;

Figure 2 is a block diagram illustrating an apparatus for implementing a bell sound selecting method for a cellular phone using an audio response system according to

the present invention; and

Figures 3 and 4 are flow charts illustrating a bell sound selecting method for a cellular phone using an audio response system according to the present invention.

MODES FOR CARRYING OUT THE INVENTION

The embodiments of the present invention will be explained with reference to the accompanying drawings.

When an user selects his or her own bell sound by connecting a cellular phone to an audio response system(ARS) 100, thus the selected bell sound is stored into a memory of the cellular phone of the user. Thereafter, a call is received into the cellular phone of the user, the received bell sound is outputted instead of a previously stored bell sound.

At this time, there are two types of the ARS provided. One is an ARS that is built in a mobile phone service company 110 which provides various bell sounds, and the other is an ARS which may be connected to a wired service provider which provides a wired network such as a Korean Telecommunication Company.

The above-described operations will be explained in detail with reference to Figures 3 and 4.

Figure 2 is a schematic block diagram illustrating the construction of a cellular phone for explaining a bell sound receiving operation, which includes a dialing unit 121 for generating a dialing tone, a receiving unit 123 for receiving a bell sound selected from the ARS, a bell sound storing unit 124 for storing the received bell sound, a microcomputer 122 for controlling each element of the cellular phone and storing a table for decoding a bell sound data based on the selected bell sound, an amplifier 125 for amplifying a bell sound when a call is received into a cellular phone, and a speaker 126 for outputting the amplified bell sound.

At this time, as the speaker 126, a router speaker, which has a speaker phone function and an internet transmission function, used based on a cellular phone, is

generally used. The first and last portions of the data are split and transmitted using an internet transmission method(for example, UP browser), so that it is possible to transmit the data irrespective of the size of the data transmitted using the cellular phone.

Also, the bell sound and tone as well as scale may be outputted.

The operation of the present invention will be explained with reference to Figures 3 and 4.

First, the operation which is implemented using the ARS 100 built in the mobile phone service company 110 will be explained. At this time, an user is connected to the ARS of the mobile phone service company 110 using his own cellular phone in Step ST100.

The ARS provided a menu so that a certain bell sound is selected using the user's own bell sound. When the user selects a bell sound in Step ST100, since the service number of the user's cellular phone is recognized and is connected, the selected bell sound is directly transmitted to the user's cellular phone.

When the selected bell sound is transmitted to the cellular phone in Step ST120, then the cellular phone converts the received bell sound into a digital signal and stores it into the bell sound storing unit 124 in Step ST130.

Next, the operation that a bell sound is received using the wired ARS will be explained. At this time, a certain connection method such as a wire method or a wireless method may be used to be connected to the ARS in Step ST100.

In the ARS, a menu is provided for a bell sound selection, and a cellular phone number input is required for receiving a bell sound when a user selects a certain bell sound in Step ST110 based on the connection. In the ARS, the bell sound is transmitted to the cellular phone designated by the user via the cellular phone service company 110.

When the above-described bell sound is transmitted to the cellular phone in Step ST120, the cellular phone converts the received bell sound into a digital signal, and the converted digital signal is stored into the bell sound

storing unit 124 in Step ST130.

The bell sound transmission format transmitted from each ARS to the cellular phone will be explained. Currently, the size of a short message service used as one of the common wireless transmission message standards is limited to the maximum 120 byte. If the bell sound is transmitted to a known music file format, a lot of amount of capacity is required for processing the same.

Therefore, in the present invention, one sound is compressed into 2 byte. The title of a melody is expressed by a Hexa value of 8byte based on a left side reference space. The speed value of the melody is expressed by the Hexa value of 1byte among the values of 0~100, and 0 represents the fastest speed. The number of the musical notes included in the melody is expressed by the Hexa value of 1byte(0X28 rests are included, 100 rests available), and in the melody(100 musical notes may be inputted), the musical notes are expressed by the pair of "tone and sound length", and the tone is expressed by the value of 1byte unit.

The codes which express the scale and the length of the scale are defined as in the following table. This table is used for coding the bell sound at each ARS and transmitting the same, and on the cellular phone, the bell sound data transmitted from the cellular phone is converted into scales, thus, the data is decoded. Therefore, the decoded data is stored into the microcomputer 122 and the memory of the cellular phone.

[Table 1] Sound selection table

Tone	Code value	Hexa value	Tone	code value	Hexa value
Low Do	1	1	Fa sharp	18	12
Do sharp	2	2	Sol	19	13

Low Rae	2	2	Sol sharp	20	14
Rae sharp	3	3	La	21	15
Low Mi	4	4	La sharp	22	16
Low Fa	5	5	Si	23	17
Fa sharp	6	6	High Do	24	18
Low Sol	7	7	Do sharp	25	19
Sol sharp	8	8	High Rae	26	1A
Low La	9	9	Rae sharp	27	1B
La sharp	10	A	High Mi	28	1C
Low Si	11	B	High Fa	29	1D
Do	12	C	Fa sharp	30	1E
Do sharp	13	D	High Sol	31	1F
Rae	14	E	Sol sharp	32	21
Rae sharp	15	F	High La	33	21
Mi	16	10	La sharp	34	22
Fa	17	11	Si	35	23

In the above Table 1, the tone expression is set in a range of 3-octave in an audible frequency range and is

classified into one octave low range, a basic octave range, and one octave high range, and a code value corresponding to a reference scale of the basic octave and a Hexa value with respect to this code value are provided. The scale of an octave lower than the reference octave is provided with a value which decreases by one step compared to the code value provided to the reference octave, and on the contrary, the scale of the octave higher than the reference octave is provided with a value which is increased by one step compared to the code value provided to the reference octave.

In addition, since the half sound is expressed by only a sharp code, in order to form a Sol flat, the Fa sharp is inputted.

[Table 2] Sound length selection table

Musical note	Code value	Hexa value
Full musical note	0	0X00
Half musical note	1	0X01
Quarter musical note	2	0X02
Eighth musical note	3	0X03
Sixteenth musical note	4	0X04
Thirty-second musical note	5	0X05
Dotted half musical note	16	0X06

Dotted quarter musical note	14	0X0e
Dotted eighth musical note	13	0X0d
Dotted sixteenth musical note	12	0X0c

In the above Table 2, the musical notes(including dotted note) are expressed by a value(for example, 0X28) of 1byte unit, and the computation of the sound length is performed using the code value of the sound length based on the following formula.

Formula>100x2[illegible]

where 100 represents a value which is used for implementing a proper sound length so that humans can most easily recognize and varies with a terminal operator. The code value of the sound length is obtained by subtracting a code value corresponding to a currently outputted musical note from the reference musical note which is set in the current terminal, which is "the code value of the sound length = the code value of the reference tone - the code value of the currently outputted musical note."

Assuming that sixteenth musical note produces 100ms, the computation of the sound length is performed using the code value of the sound length. In this state, the output time of each musical note is as follows.

Full musical note: 100x2 =1[illegible]=1600ms,
Half musical note: 100x2 -1[illegible]=1600ms,
Quarter musical note: 1[illegible] =100x2 =1600ms,
Eighth musical note: 100x2 -1[illegible]=1600ms, abd
Sixteenth musical note: 100x2 =100x2 =1600ms.

In addition, the dotted half musical note, dotted quarter musical note, dotted eighth musical note, and dotted sixteenth musical note are obtained by adding a half of each value of the dotted half musical note, dotted quarter musical note, dotted eighth musical note, and dotted sixteenth musical note to each value of the dotted half musical note, dotted quarter musical note, dotted eighth musical note, and dotted sixteenth musical note. For example, in the case of the dotted half musical note, it is 800(half musical note)+400(half value of the half musical note)=1200.

When changing the speed of the entire melody of the bell sound to slower, faster or the fastest, the function capable of adjusting the speed of the melody(0~100) may be used. A Teleservice ID that a certain data corresponds to a certain bell sound may be carried on the above-described bell sound for thereby separating a common character message and a bell sound data.

Therefore, in the case that a bell sound is received via the ARS installed in the cellular phone service company 110, the bell sound transmission frame includes a data field which represents a bell sound, and a Teleservice ID number field. In the case that a bell sound is received via the ARS which uses a wire telecommunication network, the bell sound transmission frame includes a data field which represents a bell sound, a Teleservice ID number, and a cellular phone number field for receiving the bell sound. This frame is transmitted to the cellular phone service company 110, and the cellular phone service company 110 transmits to the cellular phone which receives the frame from which the cellular phone number field is removed.

When the bell sound is stored through the above-described operations, since a plurality of bell sounds are stored in the cellular phone, the microcomputer 122 judges whether an user selected the received bell sound in Step ST140 or not. If selected, the microcomputer 122 keeps an address of the bell sound storing unit 124 which receives a bell sound to output the bell sound when a ring signal is

inputted in Step ST150. Otherwise, the microcomputer 122 has an address with respect to the previously selected bell sound in Step ST160.

Thereafter, the microcomputer 122 judges whether a ring signal is inputted via a receiving unit 123, namely, a call is inputted via the cellular phone service company 110. If the ring signal is inputted, an user searches a set bell sound in Steps ST200 and ST210.

Namely, the address of the bell sound stored in the bell sound storing unit 124 is checked.

If the received bell sound is selected, the microcomputer 122 reads a bell sound from the bell sound storing unit 124 based on the above-described address and converts into an analog signal. If there is an address with respect to the selected bell sound, the bell sound is read from the bell sound storing unit 124 based on the above-described address in Steps ST220, ST230 and ST240.

The bell sound which is read and converted into the analog signal is applied to the amplifier 125 and is amplified to a certain level so that an user can recognize the sound, and then the amplified sound is outputted trough the speaker 126 in Steps ST250 and ST260.

Therefore, the bell sound outputted through the speaker 126 is different from others' bell sounds, so that an user can easily recognize his or her own bell sound.

When the above-described router speaker is used, the bell sound may select a certain sound, not scale. At this time, the transmission frame is slightly changed. The technique for coding and decoding the current sound is known. Therefore, the description thereof will be omitted.

When a bell sound is selected as a certain sound, for example, a bell sound corresponding to a message such as "A call for Chul Su" or "This call is for Chul Su" is selected, this sound is different from other bell sounds.

The bell sound may be selected on the internet or the PC communication instead of connecting to the ARS and selecting a certain bell sound. The technique for producing a musical note on the internet may be directly used for

thereby producing an user's own musical note. The technique for producing various musical notes are well known. Therefore, the description thereof will be omitted.

Thus, the produced musical notes may be downloaded into a memory of the cellular phone using a method for transferring a bell sound using other communication networks or a transmission format technique.

The musical notes may be downloaded into a memory of the cellular phone by selecting a certain bell sound on the PC communication network or a transmission format.

As described above, if the bell sounds of the cellular phone are selected based on the bell sound database(for example, ARS method), it is possible to overcome a big limit of the bell sound storing unit 124.

In the conventional art, if the bell sounds are added and stored in the terminal as a basic option, the storing capacity of the memory is increased. However, in the present invention, since the bell sound database is provided, it is possible to select a certain bell sound from the bell sound database, so that an increased memory capacity is not needed.

Namely, in the cellular phone, the bell sounds are downloaded from the database, and the data is newly updated using an over-write function.

As described above, in the bell sound selecting method for a cellular phone according to the present invention, it is possible to receive and store a certain bell sound from the bell sound database irrespective of the storing capacity of the memory of the cellular phone. Thus, the stored bell sound is outputted when a ring signal is applied. In the present invention, it is possible to easily and correctly recognize a certain bell sound from others even at a very crowded place.

Although the preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as recited in the accompanying claims.

WHAT IS CLAIMED IS:

1. A bell sound selecting method for a cellular phone, comprising the steps of:

a first step for receiving an user's bell sound from a bell sound providing service company, thus storing the received bell sound into a memory and setting a certain mode based on the user's selection;

a second step for searching a set state of a bell sound stored in the memory when a ring signal is received from a certain caller and judging whether a received bell sound is set; and

a third step for reading a corresponding sound from the memory when the received bell sound is selected and outputting through a speaker, otherwise, reading a previously selected bell sound from the memory and outputting the same.

2. The method of claim 1, wherein a frame format received from the sound service company includes a Teleservice ID number field for separating a bell sound data, and a bell sound data field.

3. The method of claim 1, wherein said bell sound data includes a plurality of data in which each is formed of a pair of tone and sound length.

4. The method of claim 1, wherein in a scale indication of said scale:

a 3-octave range is set within an audible frequency range;

the octave of the range is classified into an octave lower by one octave, a basic octave, and an octave higher by one octave;

a code value corresponding to a reference scale including a half scale in the basic octave and a Hexa value corresponding to this code value are provided;

a value which is decreased by one step compared to the

code value provided to the reference octave in the scale of the octave lower than the reference octave; and

a value which is increased by one step compared to the code value provided to the reference octave in the scale of the octave higher than the reference octave.

5. The method of claim 4, wherein a sharp note is used for a half scale indication, and a scale having the same sound as the sharp note is used for the flat note.

6. The method of claim 4, wherein a flat note is used for the half scale indication, and a scale having the same tone as the flat note is used for the sharp note.

7. The method of claim 3, wherein said sound length is expressed by a code value corresponding to a musical note and a Hexa value with respect to the code value.

8. A bell sound selecting method for a cellular phone using an audio response system, comprising the steps of:

a first step for receiving an user's bell sound from an audio response system installed in a cellular phone service company, storing the received bell sound into a memory and changing a bell sound set state in accordance with the user's selection;

a second step for judging a set state of the bell sound when a call is received from a certain caller and judging whether the received bell sound is set; and

a third step for reading the bell sound from the memory when the received bell sound is selected, outputting the read bell sound through a speaker and otherwise reading the previously selected bell sound from the memory.

9. The method of claim 8, wherein a transmission frame format received from the audio service system includes a Teleservice ID number field for separating a bell sound data and a bell sound data field.

10. The method of claim 2, wherein said bell sound data includes a plurality of data in which each is formed of a pair of tone and sound length.

11. The method of claim 10, wherein in a scale indication of said scale:

a 3-octave range is set within an audible frequency range;

the octave of the range is classified into an octave lower by one octave, a basic octave, and an octave higher by one octave;

a code value corresponding to a reference scale including a half scale in the basic octave and a Hexa value corresponding to this code value is provided;

a value which is decreased by one step compared to the code value provided to the reference octave in the scale of the octave lower than the reference octave; and

a value which is increased by one step compared to the code value provided to the reference octave in the scale of the octave higher than the reference octave.

12. The method of claim 11, wherein a sharp scale is used for a half scale indication, and a scale having the same sound as the sharp note is used for the flat note.

13. The method of claim 11, wherein a flat note is used for the half scale indication, and a scale having the same tone as the flat note is used for the sharp note.

14. The method of claim 10, wherein said sound length is expressed by a code value corresponding to a musical note and a Hexa value with respect to the code value.

15. A bell sound selecting method for a cellular phone using an audio response system, comprising the steps of:

a first step for transmitting a frame to a cellular

phone service company when an user is connected to an audio service system installed in a wired communication service company;

a second step for changing a frame by the cellular phone service company which receives the frame, transmitting the changed frame to the cellular phone, receiving the changed frame from the cellular phone, storing into a memory and changing the bell sound set state in accordance with a selection of another user;

a third step for judging a set state of the bell sound when a call is received from someone and judging whether the received bell sound is set or not; and

a fourth step for reading a bell sound from the memory when the received bell sound is selected, outputting the read bell sound through a speaker, and otherwise reading the previously selected bell sound from the memory and outputting the sound.

16. The method of claim 15, wherein a transmission frame format received from the cellular phone service company in the first step includes a Teleservice ID number field for separating a bell sound data, a bell sound data field and a cellular phone number field which received the bell sound.

17. The method of claim 15, wherein a transmission frame format received from the cellular phone service company in the second step includes a Teleservice ID number field for separating a bell sound data and a bell sound data field.

18. The method of claim 16, wherein said bell sound data includes a plurality of data in which each is formed of a pair of tone and sound length.

19. The method of claim 16, wherein in a scale indication of said scale:

a 3-octave range is set within an audible frequency

range;

the octave of the range is classified into an octave lower by one octave, a basic octave, and an octave higher by one octave;

a code value corresponding to a reference scale including a half scale in the basic octave and a Hexa value corresponding to this code value is provided;

a value which is decreased by one step compared to the code value provided to the reference octave in the scale of the octave lower than the reference octave; and

a value which is increased by one step compared to the code value provided to the reference octave in the scale of the octave higher than the reference octave.

20. The method of claim 19, wherein a sharp note is used for a scale indication, and a scale having the same sound as the sharp note is used for the flat note.

21. The method of claim 19, wherein a flat note is used for the scale indication, and a scale having the same tone as the flat note is used for the sharp note.

22. The method of claim 16, wherein said sound length is expressed by a code value corresponding to a musical note and a Hexa value with respect to the code value.

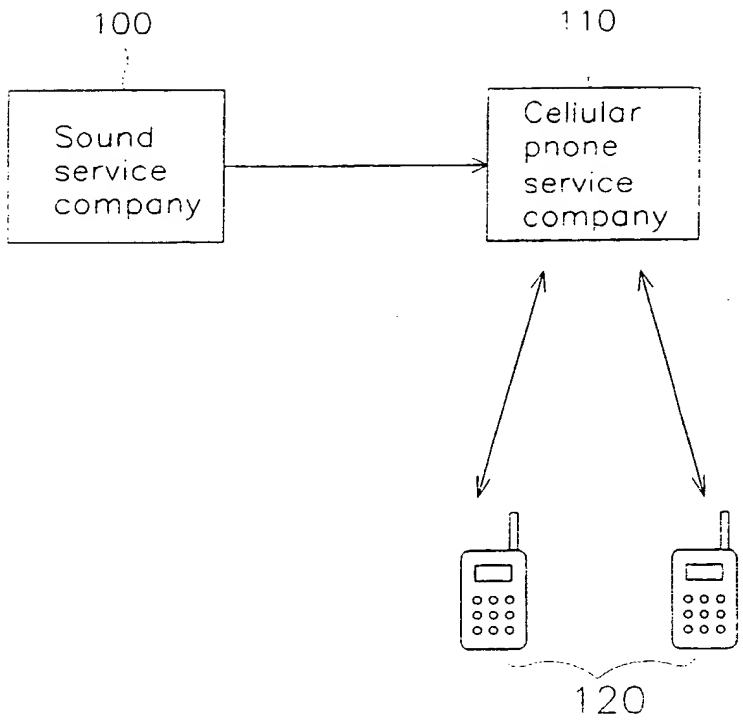
100
110
Sound service company
Celiular phone service company
120

Fig.1

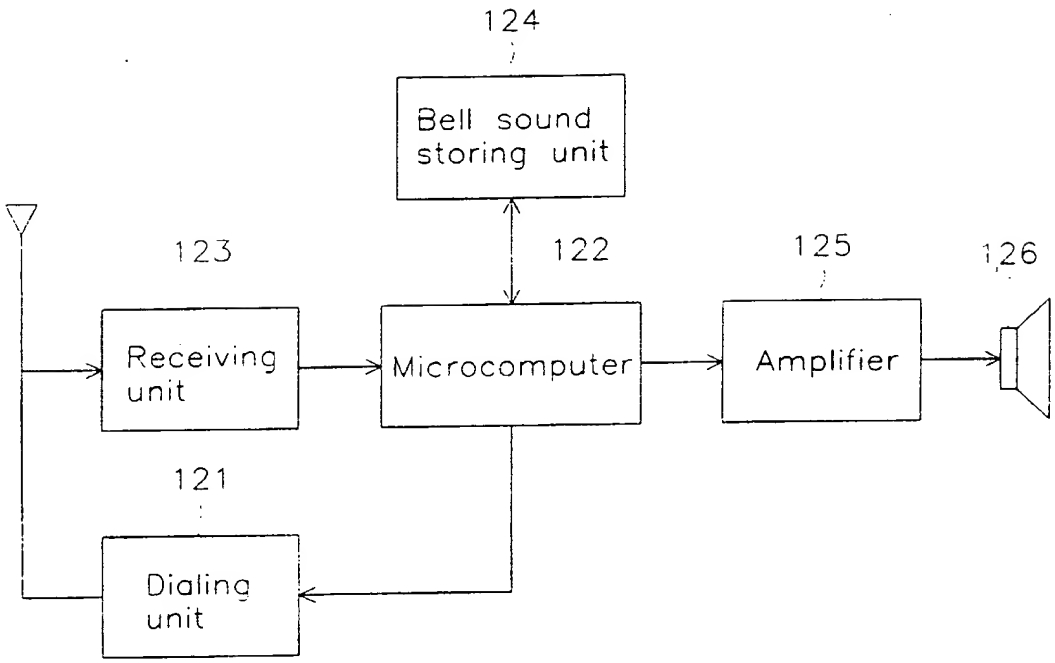
124
Bell sound storing unit
123
122
125
126
Receiving unit
Microcomputer
Amplifier
121
Dialing unit

Fig.2

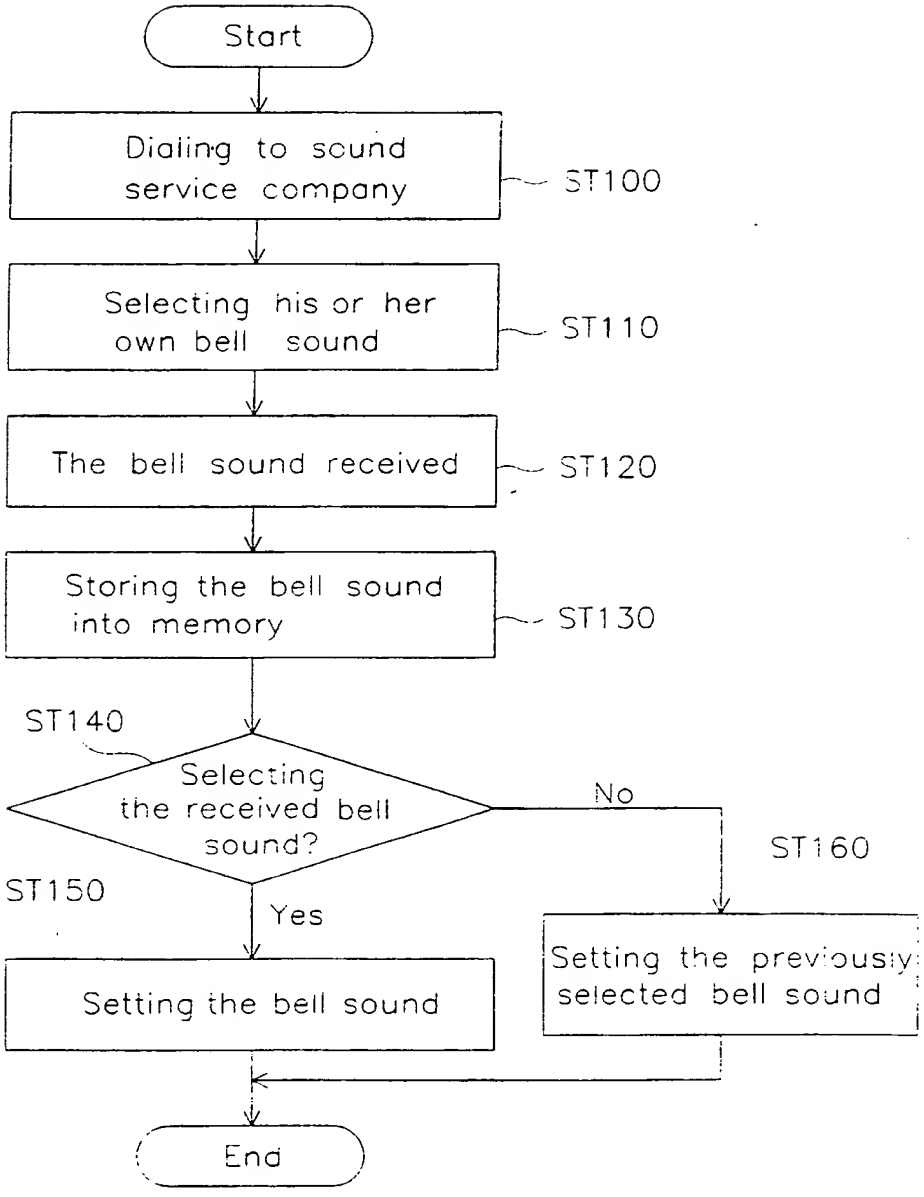
Start
Dialing to sound service company
ST100
Selecting his or her own bell sound
ST110
The bell sound received
ST120
Storing the bell sound into memory
ST130
ST140
Selecting the received bell sound?
No
ST160
ST150
Yes
Setting the bell sound
Setting the previously selected bell sound
End

Fig.3

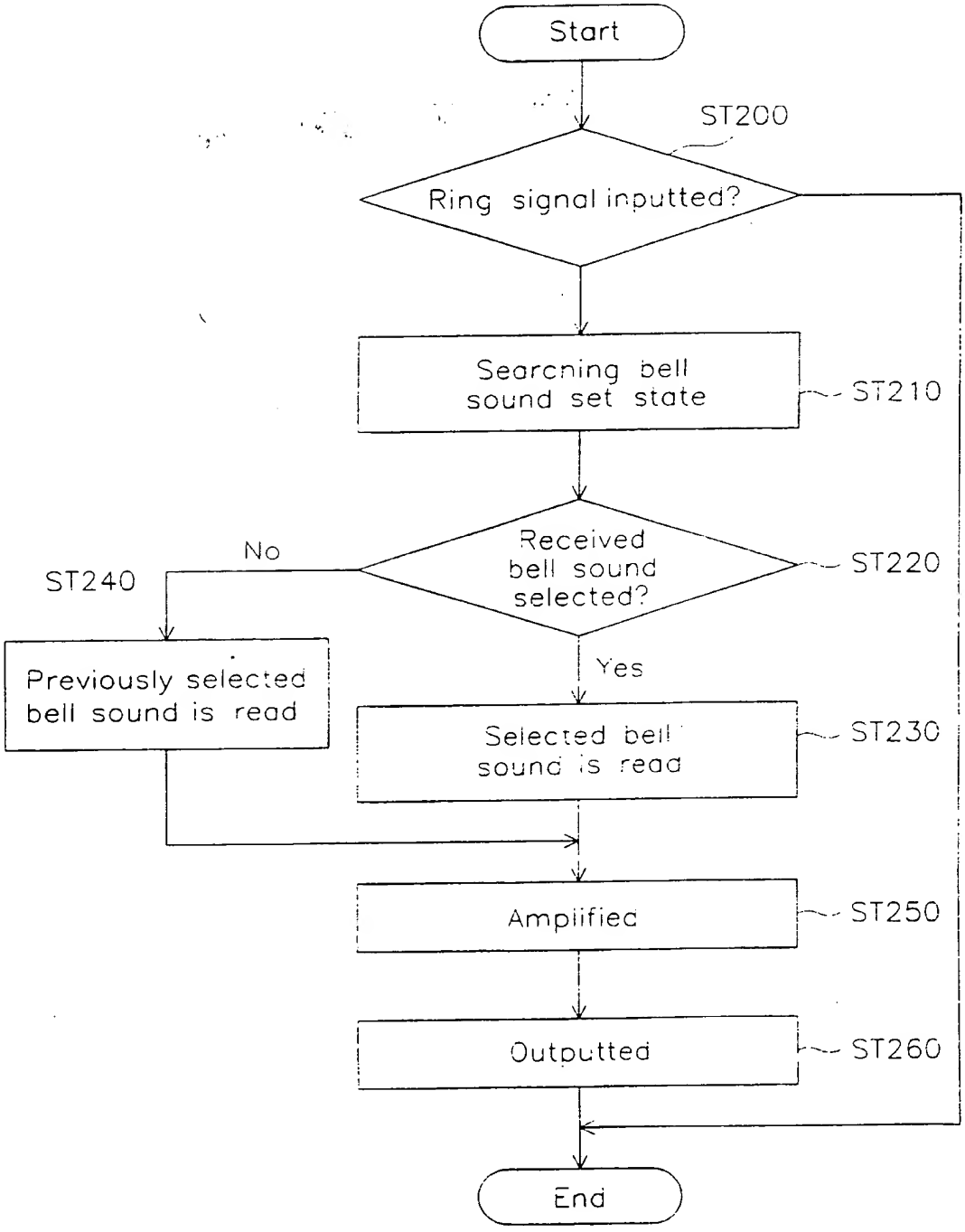
Start
ST200
Ring signal inputted?
Searching bell sound set state
ST210
Received bell sound selected?
ST220
No
ST240
Previously selected bell sound is read
Yes
Selected bell sound is read
ST230
Amplified
ST250
Outputted
ST260
End

Fig.4

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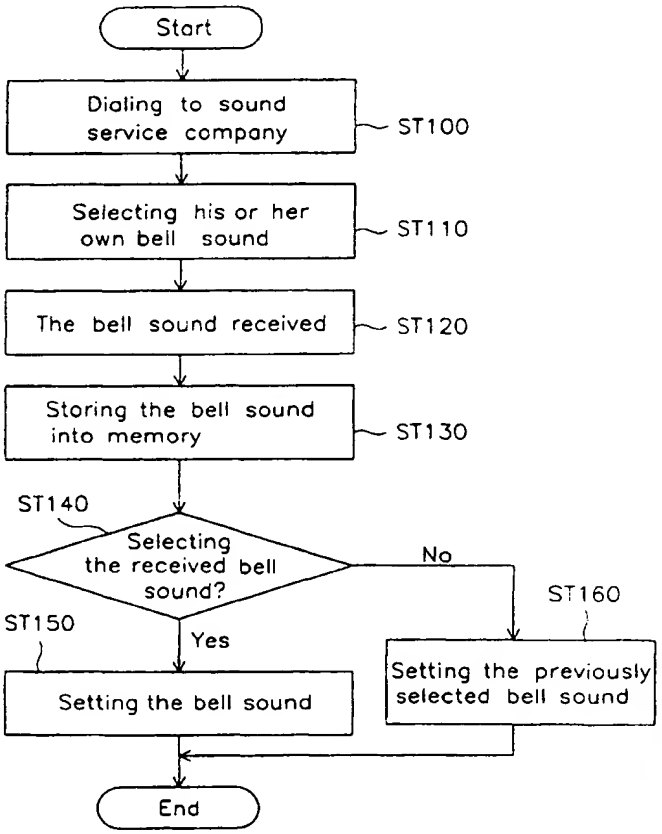
(57) Abstract

A bell sound selecting method for a cellular phone using an audio response system is disclosed. In this method, a user can easily recognize his or her own bell sound which is different from other's, by receiving his or her own distinctive bell sound from the audio response system and outputting the received bell sound when a call is received into the cellular phone. Therefore, the user of the cellular phone can correctly recognize his or her own bell sound even at a very crowded place.



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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

IPC[7]: H 04 Q 7/22, H 04 M 1/72

According to International Patent Classification (IPC) or to both national classification and IPC

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Category°	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	WO 98/19480 A2 (ERICSSON, INC.) 07 May 1998 (07.05.98) page 6, line 27 - page 8, line 16; claims 8,15.	1, 8, 15 2, 9, 16
Y	EP 0851649 A2 (NOKIA MOBILE PHONES LTD.) 01 July 1998 (01.07.98) page 3, line 8 - 39; page 11, line 11-19.	1, 2, 8, 9 15-17
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Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/200	Mehlmauer Telephone No. 1/53424/376

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